HIGH-RESOLUTION INFRARED SPECTRA OF JET-COOLED METHOXY RADICAL (CH_3O): C-H STRETCH VIBRATIONS

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The high-resolution infrared spectra of jet-cooled methoxy radical (CH_3O) in the region 2850-2940 cm^{-1} have been recorded in pulsed slit jet expansions with the excimer laser flash photolysis method. A perpendicular band centered at 2885.7 cm^{-1} was assigned to a portion of the C-H asymmetric stretch vibration of CH_3O using ground state combination differences. Five sub-bands with P'' = -3/2, -1/2, +1/2, +3/2, +5/2 and J'' up to 8.5 have been assigned. The series of Q branches almost equally separated by 12.4 cm^{-1} with intensity patterns characteristic of perpendicular transitions supports the assignment. Because of the low jet temperature, the assigned transitions all arise from the $E_{3/2}$ fine structure component of the ground state. The asymmetric C-H stretch vibration is subject to a strong Jahn-Teller effect, which should produce several subbands. The firm vibrational assignment of this band requires data for all C-H stretch bands. Least squares fitting of this band and scanning over more of the C-H stretching region scan for other bands are proceeding in our lab.